

REMARKS

Applicant respectfully traverses the 35 U.S.C. § 102(e) rejection of claims 1-4 over Hamada.

Hamada discloses in Fig. 1 an N-type region (30), and a P-type region (32) alternately and discreetly arranged. Trench emitter regions 28, facing a facing a trench gate on a surface of a semiconductor are connected with the N-type emitter region (30), so the effective channel width is equal to the channel width Y during an ON period. For this reason, as discussed in the present application, an excessive amount of current flows from N-type region 28 to an N-type epitaxial layer (22) through a P-type body layer (24) in case of a short circuit, which can cause breakdown of the device.

In accordance with the present invention, referring to the surface of a semiconductor substrate, in an effective channel region low in resistance, a region having an emitter region is reversed to become an effective channel portion when voltage is applied to a gate electrode. The other portion with no emitter region has higher resistance for a carrier when voltage is applied, so that the portion becomes invalid as a channel. Consequently, channel width is reduced, making it possible to reduce current in the event of a short circuit. As set forth in amended claim 1, an effective channel width, which is a width of a facing portion of a second-conduction-type emitter and the gate electrode at the surface level, is smaller than a whole width of the gate electrode. Hamada lacks at least this feature. At least for this reason, the device disclosed in Hamada fails to anticipate amended claim 1, or dependent claims 2-4.

Applicant gratefully acknowledges the indication of allowable subject matter in claims 5-20, but submits that it is premature to amend these claims to be independent, until the Examiner considers amended claims 1 and 2 in view of the above arguments.


In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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